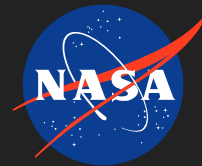


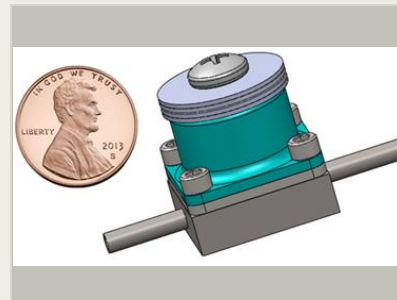
# Miniaturized Lightweight Monopropellant Feed System for Nano- and Micro-satellites, Phase I

Completed Technology Project (2015 - 2015)



## Project Introduction

There is a need for viable and practical solutions for utilizing chemical thrusters operating with green monopropellants on small- and micro-satellites and cubesats (100 kg-500 kg and less than 100 kg). Conventional approaches scale down poorly, due to the size, mass, and power requirements of components needed for high pressure propellant storage and flow control. For small spacecraft already facing significant mass and volume constraints, these systems severely limit the amount of propellant storage capacity. Systima proposes to develop a miniaturized low power propellant feed and flow control system for green monopropellant thrusters that enables use of very low-pressure propellant storage vessels and high efficiency packaging. The proposed system can provide full feed system and flow control functionality for 0.5 to 1N-scale green monopropellant thrusters while consuming less than 1 Watt. There are no limitations on the type monopropellant that can be used with Systima's miniaturized pump. This program will target development of the pump for use with propulsion systems operating with advanced green monopropellant AF-M315E. This monopropellant has low-toxicity making it easy to store, integrate into modular designs and launch without added costs associated with handling toxic propellants such as hydrazine. In the Phase I program Systima will demonstrate the technology through analysis, and fabrication and testing of critical components. Phase I testing will evaluate preliminary system operation parameters that will be used to develop an integrated pump concept design. In Phase II, Systima will design and fabricate an integrated prototype pump system to demonstrate system performance and capability to meet thruster feed system requirements. Optimization of the design to minimize the system size, weight and power requirements will be conducted for chemical propulsion system integration onto small spacecraft.



Miniaturized Lightweight Monopropellant Feed System for Nano- and Micro-satellites, Phase I

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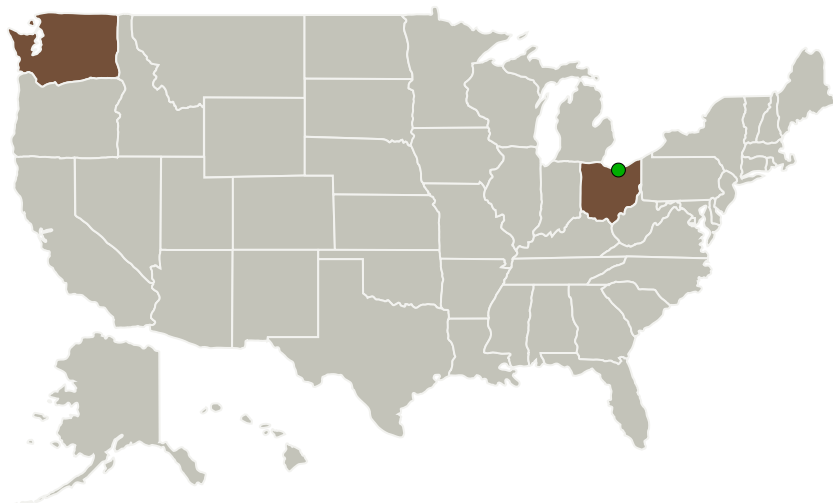
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Systima Technologies, Inc.	Lead Organization	Industry	Kirkland, Washington
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

### Primary U.S. Work Locations

Ohio	Washington
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## Project Transitions



**June 2015:** Project Start



**December 2015:** Closed out

**Closeout Summary:** Miniaturized Lightweight Monopropellant Feed System for Nano- and Micro-satellites, Phase I Project Image

### Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/139238>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Systima Technologies, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

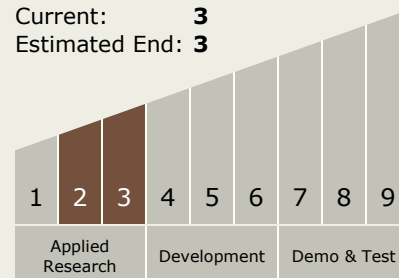
Carlos Torrez

### Principal Investigator:

Stephanie Sawhill

## Technology Maturity (TRL)

Start: **2**  
Current: **3**  
Estimated End: **3**

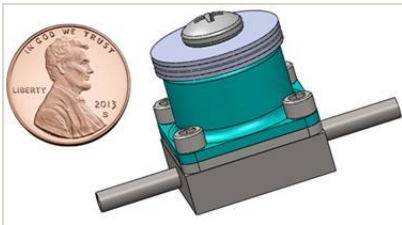


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## Images



### Briefing Chart Image

Miniaturized Lightweight Monopropellant Feed System for Nano- and Micro-satellites, Phase I  
(<https://techport.nasa.gov/image/130343>)

## Technology Areas

### Primary:

- TX01 Propulsion Systems
  - └ TX01.1 Chemical Space Propulsion
    - └ TX01.1.2 Earth Storable

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System